INDEX TO VOLUME 65D

January to December 1961

A

Page

A few observations of the perturbations in the phase of the low-frequency ground wave ... 393
A quick method for estimating the stage of the sunspot cycle ... 637
A new approach to the mode theory of VLF propagation ... 37
A note concerning the excitation of ELF electromagnetic waves ... 481
Abraham, L. G., Jr., J. A. Bradshaw, Weather and reception level on a troposphere link—annual and short-term correlations ... 155
Absorption, radio wave, of several gases in the 100 to 117 kMc/s frequency range ... 15
Agy, V., K. Davies, R. Salaman, An atlas of oblique-incidence ionograms (a digest) ... 35
Airglow excitation by gyrowaves, power density requirements ... 321
Almost fifty years of URSI ... 317
Amplitude and angular scintillations of the radio source Cygnus-A observed at Boulder, Colo ... 333
Amplitude distribution of VLF atmospheric noise, effect of receiver bandwidth ... 299
Analysis of LF ionospheric radio propagation phenomena ... 507
Angles upon HF radio signals propagated over long distances, effect of antenna radiation ... 167
Angular and amplitude scintillations of the radio source Cygnus-A observed at Boulder, Colo ... 333
Antenna coupling error in direction finders ... 363
Antenna, high-resolution rapid-scan ... 101
Antenna radiation angles upon HF radio signals propagated over long distances, effect ... 167
Antenna, underground, useful radiation ... 89
Antenna with a circular conducting-disk ground system on the surface of a lossy half-space, impedance of a monopole ... 183
Antennas, circular aperture, Fresnel region fields ... 137
Appleton-Hartree formula, validity of some approximations ... 323
Approximations to the Appleton-Hartree formula, validity ... 323
Atlas of oblique-incidence ionograms (a digest) ... 35
Atmosphere, formula for radio ray refraction in an exponential ... 181
Atmosphere, graphical determination of radio ray bending in an exponential ... 175
Atmospheric radio noise predictions, reliability ... 565
Attenuation coefficients for propagation at very low frequencies (VLF) during a sudden ionospheric disturbance (SID) ... 543
Attenuation rate of ELF radio waves, observed ... 475
Auroral arcs, red, and ionospheric recombination, relationship ... 129
Automatic direction finding, design for spinning goniometer ... 237

B

Bailey, V. A., Power density requirements for airglow excitation by gyrowaves ... 321
Bain, W. C., Phase difference observations at spaced aerials and their application to direction-finding ... 229
Barsis, A. P., R. S. Kirby, VHF and UHF signal characteristics observed on a long knife-edge diffraction path ... 437
Beale, E. M. L., Brooke variance classification system for DF bearings ... 255
—, Estimation of variances of position lines from fixes with unknown target positions ... 263
Bean, B. R., B. A. Cahoon, Correlation of monthly median transmission loss and refractive index profile characteristics ... 67
Blackband, W. T., Effects of the ionosphere on VLF navigational aids ... 575
Blair, J. C., R. N. Davis, Jr., R. C. Kirby, Frequency dependence of *D*-region scattering at VHF ... 417
Blair, W. E., R. K. Moore, Dipole radiation in a conducting half space ... 547
Boules, K. L., Incoherent scattering by free electrons as a technique for studying the ionosphere and exosphere: some observations and theoretical considerations ... 1
Bradshaw, J. A., L. G. Abraham, Jr., Weather and reception level on a troposphere link—annual and short-term correlations ... 155
Britt, C. O., C. W. Tolbert, A. W. Straiton, Radio wave absorption of several gases in the 100 to 117 kMc/s frequency range ... 15
Brooke variance classification system for DF bearings ... 255
Bowhill, S. A., Diversity effects in long distance high frequency radio pulse propagation ... 213
—, Statistics of a radio wave diffracted by a random ionosphere ... 275
Brown, W. W., A. D. Watt, R. W. Plush, A. H. Morgan, Worldwide VLF standard frequensy and time signal broadcasting ... 617

C

Cahoon, B. A., B. R. Bean, Correlation of monthly median loss and refractive index profile characteristics ... 67
Chadwick, W. B., A quick method for estimating the stage of the sunspot cycle ... 637
Characteristics of waveguides for long-distance transmission ... 75
Classification system for DF bearings, Brooke variance ... 255
Collision frequencies of free electrons in an ionized region, the electrically short antenna for measuring ... 371
Comparison between mode theory and ray theory of VLF propagation ... 357
Composite cylinder, on the theory of diffraction ... 19
Computation of whistler ray paths ... 485
Conducting half space, dipole radiation ... 547
Correlation arrays, resolution characteristics ... 245
Corelation of monthly median transmission loss and refractive index profile characteristics ... 67
Correlations, annual and short-term, weather and reception level on a troposphere link ... 155
Cottony, H. V., A. C. Wilson, A high-resulution rapid-scan antenna ... 101
Coupled variables, nonsingular embedding of transition processes within a more general framework ... 595
Crombie, D. D., Reflection from a sharply bounded ionosphere for VLF propagation perpendicular to the magnetic meridian ... 455
Cygnus-A observed at Boulder, Colo., amplitude and angular scintilations of the radio source ... 333
Cylinder, on the theory of diffraction by a composite ... 19

D

Davies, K., King, G. A. M., On the validity of some approximations to the Appleton-Hartree formula ... 323
—, *R. Salaman, V. Agy*, An atlas of oblique-incidence ionograms (a digest) ... 35
Davis, R. N., Jr., J. C. Blair, R. C. Kirby, Frequency dependence of *D*-region scattering at VHF ... 417
Decker, M. T., W. J. Hartman, Mutual interfernce between surface and satellite communication systems ... 433
Dellinger, J. H., Almost fifty years of URSI ... 317
Denton, D. H., R. W. P. King, C. W. Harrison, The electrically short antenna as a probe for measuring free electron densities and collision frequences in an ionized region ... 371
Design for spinning goniometer automatic direction finding ... 237
Design of panoramic ionospheric resources ... 629
DF bearings, Brooke variance classification system ... 255
Diffraction by a composite cylinder ... 19
Digital methods for the extraction of phase and amplitude information from a modulated signal ... 351
Dipole, excitation of VLF and ELF radio waves by a horizontal magnetic ... 305
Dipole radiation in a conducting half space ... 547
Direction finders, antenna coupling error ... 363
Direction-finding, phase difference observations at spaced aerials and their application ... 229
Direction-finding problems, long-distance location ... 233
Direction-finding techniques; propagation studies ... 197
Distance high frequency radio pulse propagation, diversity effects ... 213
Diversity effects in long distance high frequency radio pulse propagation ... 213
Dobrott, D., A. Ishimaru, East-west effect on VLF mode transmission across the earth's magnetic field ... 47
Doherty, R. H., G. Hefley, R. F. Linfield, Initial results of a new technique for investigating sferic activity ... 157
D-region scattering at VHF, frequency dependence of ... 417

E

Earth and ionosphere, resonance of the space ... 465
East-west effect on VLF mode transmission across the earth's magnetic field ... 47
Effect of antenna radiation angles upon HF radio signal propagated over long distances ... 167
Effect of multiple atmospheric inversions on tropospheric radio propagation ... 385
Effect of receiver bandwidth on the amplitude distribution of VLF atmospheric noise ... 299
Effects of the ionosphere on VLF navigational aids ... 575
Electrically short antenna as a probe for measuring free electron densities and collision frequencies in an ionized region ... 371
Electromagnetic waves, note concerning the excitation of ELF ... 481
Electron densities, electrically short antenna for measuring ... 371
ELF and VLF radio waves by a horizontal magnetic dipole, excitation ... 305
ELF electromagnetic waves, a note concerning the excitation ... 481
ELF radio waves, observed attentuation rate ... 475
Embedding of transition processes, nonsingular, within a more general framework of coupled variables ... 595
Error in direction finders, antenna coupling ... 363
Estimation of variances of position lines from fixes with unknown target positions ... 263
Excitation of ELF electromagnetic waves, a note concerning ... 481
Excitation of VLF and ELF radio waves by a horizontal magnetic dipole ... 305
Exosphere and ionosphere, incoherent scattering by free electrons as a technique for studying: some observations and theoretical considerations ... 1
Experimental study of inverted L-, T-, and related transmission-line antennas ... 449
Extraction of phase and amplitude information from a modulated signal, digital methods ... 351
Extremely low frequencies, on the spectrum of terrestrial radio noise ... 581

F

F-layer and sporadic-*E* at VHF in the Far East, observation ... 93
Formula for radio ray refraction in an exponential atmosphere ... 181
Free-balloon borne meterological refractometer ... 149
Frequency dependence of *D*-region scattering at VHF ... 417
Fresnel region fields of circular aperture antennas ... 137
Fulton, F. F., Jr., Effect of receiver bandwidth on the amplitude distribution of VLF atmospheric noise ... 299

G

Galejs, J., Excitation of VLF and ELF radio waves by a horizontal magnetic dipole ... 305
Gases, radio wave absorption, in the 100 to 117 kMc/s frequency range ... 15
Gething, P. J. D., Influence of ionospheric conditions on the accuracy of high frequency direction finding ... 225
Gossard, E. E., J. F. Theisen, Free-balloon borne meteorological refractometer ... 149
Graphical determination of radio ray bending in an exponential atmosphere ... 175
Ground wave, low-frequency phase, a few observations of the perturbations ... 393
Ground-wave propagation on a spherical earth, theory of mixed-path ... 401

H

Page

Harrison, C. W. Jr., Antenna coupling error in direction finders ... 363
—, *R. W. P. King, D. H. Denton*, The electrically short antenna as a probe for measuring free electron densities and collision frequencies in an ionized region ... 371
Hartman, W. J., M. T. Decker, Mutual interference between surface and satellite communication systems ... 433
Hayden, E. C., Instrumentation for propagation and direction-finding measurements ... 253
—, Propagation studies using direction-finding techniques ... 197
Hayre, H. S., R. K. Moore, Theoretical scattering coefficient for near vertical incidence from contour maps ... 427
Heading, J., Nonsingular embedding of transition processes within a more general framework of coupled variables ... 595
Hefley, G., R. H. Doherty, R. F. Linfield, Initial results of a new technique for investigating sferic activity ... 157
Heim, D. S., W. J. Lindsay, Design for spinning goniometer automatic direction finding ... 237
Heisler, L. H., L. D. Wilson, Design of panoramic ionospheric resources ... 629
Herman, J. R., Reliability of atmospheric radio noise predictions ... 565
High frequency backscatter sounders, ionospheric motions ... 115
High frequency direction finding, influence of ionospheric conditions on the accuracy of ... 225
High frequency radio pulse propagation, diversity effects in long distance ... 213
High-resolution rapid-scan antenna ... 101
Horizontal polarization, smooth earth diffraction calculations ... 397
Hu, Ming-Kuei, Fresnel region fields of circular aperture antennas ... 137

I

Impedance of a monopole antenna with a circular conducting-disk ground system on the surface of a lossy half-space ... 183
Incoherent scattering by free electrons as a technique for studying the ionosphere and exosphere: some observations and theoretical considerations ... 1
Influence of ionospheric conditions on the accuracy of high frequency direction finding ... 225
Initial results of a new technique for investigating sferic activity ... 157
Instrumentation for propagation and direction-finding measurements ... 253
Interference, mutual, between surface and satellite communication systems ... 433
Inverted L-, T-, and related transmission-line antennas, experimental study ... 449
Ionograms (a digest), an atlas of oblique-incidence ... 35
Ionosphere and earth, resonance of the space ... 465
Ionosphere and exosphere, incoherent scattering by free electrons as a technique for studying: some observations and theoretical considerations ... 1
Ionosphere, magneto-ionic propagation phenomena in low- and very-low-radiofrequency waves reflected ... 53
Ionospheric conditions on the accuracy of high frequency direction finding, influence ... 225
Ionospheric motions observed with high frequency backscatter sounders ... 115
Ionospheric recombination and red auroral arcs, relationship ... 129
Ishikawa, M., K. Miya, T. Sasaki, Observations of *F*-layer and sporadic-*E* scatter at VHF in the Far East ... 93
Ishimaru, A., D. Dobrott, East-west effect on VLF mode transmission across the earth's magnetic field ... 47

J

Jean, A. G., A. C. Murphy, J. R. Wait, D. F. Wasmundt, Observed attenuation rate of ELF radio waves ... 475
Jespersen, J. L., R. S. Lawrence, R. C. Lamb, Amplitude and angular scintillations of the radio source Cygnus-A observed at Boulder, Colo ... 333
—, —, —, Digital methods for the extraction of phase and amplitude information from a modulated signal ... 351
Johler, J. R., Magneto-ionic propagation phenomena in low- and very-low-radiofrequency waves reflected by the ionosphere ... 53
—, On the analysis of LF ionospheric radio propagation phenomena ... 507

K

Karbowiak, A. E., L. Solymar, Characteristics of waveguides for long-distance transmission ... 75
King, G. A. M., K. Davies, On the validity of some approximations to the Appleton-Hartree formula ... 323
—, *F. E. Roach*, Relationship between red auroral arcs and ionospheric recombination ... 129
King, R. J., S. W. Maley, Impedance of a monopole antenna with a circular conducting-disk ground system on the surface of a lossy half-space ... 183
King, R. W. P., C. W. Harrison, D. H. Denton, The electrically short antenna as a probe for measuring free electron densities and collision frequencies in an ionized region ... 371
—, *S. Prasad*, Experimental study of inverted L-, T-, and related transmission-line antennas ... 449
Kirby, R. C., J. C. Blair, R. N. Davis, Jr., Frequency dependence of *D*-region scattering at VHF ... 417
Kirby, R. S., A. P. Barsis, VHF and UHF signal characteristics observed on a long knife-edge diffraction path ... 437
Kirch, J. E., J. M. Ross, A few observations of the perturbations in the phase of the low-frequency ground wave ... 393
Kirchhoff-Huygens' principle ... 427
Knife-edge diffraction path, VHF and UHF signal characteristics observed ... 437
Kodis, R. D., On the theory of diffraction by a composite cylinder ... 19

L

Lamb, R. C., R. S. Lawrence, J. L. Jespersen, Amplitude and angular scintillations of the radio source Cygnus-A observed at Boulder, Colo ... 333
—, —, —, Digital methods for the extraction of phase and amplitude information from a modulated signal ... 351

Page

Lawrence, R. S., J. L. Jespersen, R. C. Lamb, Amplitude and angular scintillations of the radio source Cygnus-A observed at Boulder, Colo ... 333
—, —, —, Digital methods for the extraction of phase and amplitude information from a modulated signal ... 351
Linder, I. W., Resolution characteristics of correlation arrays ... 245
Lindsay, W. J., D. S. Heim, Design for spinning goniometer automatic direction finding ... 237
Lines from fixes with unknown target positions, estimation of variances ... 263
Linfield, R. F., G. Hefley, R. H. Doherty, Initial results of a new technique for investigating sferic activity ... 157
LF ionospheric radio propagation phenomena, analysis ... 507
Long-distance location and direction-finding problems ... 233
Low-angle radiation from a monopole, measurements ... 641
Low-frequency ground wave phase perturbations, a few observations ... 393

M

Magnetic field, Earth's east-west effect on VLF mode transmission ... 47
Magnetic meridian, reflection from a sharply bounded ionosphere for VLF perpendicular propagation ... 455
Magneto-ionic propagation phenomena in low- and very-low-radiofrequency waves reflected by the ionosphere ... 53
Maley, S. W., R. J. King, Impedance of a monopole antenna with a circular conducting-disk ground system on the surface of a lossy half-space ... 183
Measurements of low-angle radiation from a monopole ... 641
Measurements, propagation and direction-finding instrumentation ... 253
Meteorological refractometer, free-balloon borne ... 149
Mixed-path ground-wave propagation on a spherical earth ... 401
Miya, K., T. Sasaki, M. Ishikawa, Observation of *F*-layer and sporadic-*E* scatter at VHF in the Far East ... 93
Mode theory and ray theory of VLF propagation, comparison ... 357
Mode theory of VLF propagation, a new approach ... 37
Modulated signal, digital methods for the extraction of phase and amplitude information ... 351
Monopole antenna with a circular conducting-disk ground system on the surface of a lossy half-space, impedance ... 183
Moore, A. H., W. E. Blair, Dipole radiation in a conducting half space ... 547
—, *H. S. Hayre*, Theoretical scattering coefficient for near vertical incidence from contour maps ... 427
Morgan, A. H., A. D. Watt, R. W. Plush, W. W. Brown, Worldwide VLF standard frequency and time signal broadcasting ... 617
Motion characteristics of the backscatter ... 115
Multiple atmospheric inversions on tropospheric radio propagation, effect ... 385
Murphy, A. C., A. G. Jean, J. R. Wait, D. F. Wasmundt, Observed attenuation rate of ELF radio waves ... 475
Mutual interference between surface and satellite communication systems ... 433

N

Navigational aids, effects of the ionosphere on VLF ... 575
NBS research applicable to long-distance location and direction-finding problems ... 233
Near vertical incidence from contour maps, theoretical scattering coefficient ... 427
Nonsingular embedding of transition processes within a more general framework of coupled variables ... 595
Northover, F. H., Effect of multiple atmospheric inversions on tropospheric radio propagation ... 385

O

Oblique-incidence ionograms (a digest), an atlas ... 35
Observed attenuation rate of ELF radio waves ... 475
Observation of *F*-layer and sporadic-*E* scatter at VHF in the Far East ... 93
On the spectrum of terrestrial radio noise at extremely low frequencies ... 581
On the theory of diffraction by a composite cylinder ... 19
On the theory of mixed-path ground-wave propagation on a spherical earth ... 401
On the validity of some approximations to the Appleton-Hartree formula ... 323

P

Panoramic ionospheric resources, design ... 629
Pappas, C. F., L. E. Vogler, P. L. Rice, Graphical determination of radio ray bending in an exponential atmosphere ... 175
Parker, E. N., Solar wind ... 537
Path, VHF and UHF signal characteristics observed on a long knife-edge diffraction path ... 437
Paths, whistler ray, computation ... 485
Perturbations in the phase of the low-frequency ground wave, a few observations ... 393
Pierce, E. T., Attenuation of coefficients for propagation at very low frequencies (VLF) during a sudden ionosphere disturbance (SID) ... 543
Plush, R. W., A. D. Watt, W. W. Brown, A. H. Morgan, Worldwide VLF standard frequency and time signal broadcasting ... 617
Poeverlein, H., Resonance of the space between earth and ionosphere ... 465
Position lines from fixes with unknown target positions, estimation of variances ... 263
Power density requirements for airglow excitation by gyrowaves ... 321
Prasad, S., R. W. P. King, Experimental study of inverted L-, T-, and related transmission-line antennas ... 449
Propagation, a new approach to the mode theory of VLF ... 37
Propagation and direction finding measurements, instrumentation ... 253
Propagation at very low frequencies (VLF) during a sudden ionospheric disturbance (SID), attenuation coefficients ... 543
Propagation, diversity effects in long distance high frequency radio pulse ... 213
Propagation in the earth's crust, radio-wave ... 189
Propagation on a spherical earth, theory of mixed-path ground-wave ... 401
Propagation phenomena, magneto-ionic, in low- and very-low-radiofrequency waves reflected by the ionosphere ... 53
Propagation studies using direction-finding techniques ... 197

R

Page

Radar detection of surface roughness ... 427
Radiation, useful, from an underground antenna ... 89
Radio noise predictions, atmospheric, reliability ... 565
Radio propagation phenomena, on the analysis of I F ionospheric ... 507
Radio pulse propagation, diversity effects in long distance high frequency ... 213
Radio ray bending in an exponential atmosphere, graphical determination ... 175
Radio ray refraction in an exponential atmosphere, formula ... 181
Radio signals propagated over long distances, effect of antenna radiation angles upon HF ... 167
Radio signals, space analysis ... 293
Radio source Cygnus-A observed at Boulder, Colo., amplitude and angular scintillations ... 333
Radio wave absorption of several gases in the 100 to 117 kMc/s frequency range ... 15
Radio wave diffracted by a random ionosphere, statistics ... 275
Radio-wave propagation in the earth's crust ... 189
Radio waves by a horizontal magnetic dipole, excitation of VLF and ELF ... 305
Radio waves, observed attentuation rate of ELF ... 475
Radiofrequency waves, low- and very-low-, reflected by the ionosphere, magneto-ionic propagation phenomena ... 53
Raemer, H. R., On the spectrum of terrestrial radio noise at extremely low frequencies ... 581
Rapid-scan, high-resolution antenna ... 101
Reflection from a sharply bounded ionosphere for VLF propagation perpendicular to the magnetic meridian ... 455
Refraction in an exponential atmosphere, formula for radio ray ... 181
Refractive index profile characteristics and monthly median transmission loss, correlation ... 67
Refractometer, free-balloon borne meteorological ... 149
Related transmission-line antennas, experimental study of inverted L-, T- ... 449
Relationship between red auroral arcs and ionospheric recombination ... 129
Reliability of atmospheric radio noise predictions ... 565
Research at NBS applicable to long-distance location and direction-finding problems ... 233
Resolution characteristics of correlation arrays ... 245
Resonance of the space between earth and ionosphere ... 465
Rice, P. L., C. F. Pappas, L. E. Vogler, Graphical determination of radio ray bending in an exponential atmosphere ... 175
Roach, F. E., G. A. M. King, Relationship between red auroral arcs and ionospheric recombination ... 129
Ross, J. M., J. E. Kirch, A few observations of the perturbations in the phase of the low-frequency ground wave ... 393

S

Salaman, R., V. Agy, K. Davies, An atlas of oblique-incidence ionograms (a digest) ... 35
Sasaki, T., K. Miya, M. Ishikawa, Observation of *F*-layer and sporadic-*E* scatter at VHF in the Far East ... 93
Satellite and surface communication systems, mutual interference ... 433
Scattering at VHF, frequency dependence of *D*-region ... 417
Scattering, incoherent, by free electrons as a technique for studying the ionosphere and exosphere: Some observations and theoretical considerations ... 1
Scintillations of the radio source Cygnus-A observed, amplitude and angular, at Boulder, Colo ... 333
Sferic activity, initial results of a new technique for investigating ... 157
Signal, VHF and UHF, characteristics observed on a long knife-edge diffraction path ... 437
Silberstein, R., Research at NBS applicable to long-distance location and direction-finding problems ... 233
Smooth earth diffraction calculations for horizontal polarization ... 397
Smyth, J. B., Space analysis of radio signals ... 293
Solar wind ... 537
Solymar, L. A. E. Karbowiak, Characteristics of waveguides for long-distance transmission ... 75
Space analysis of radio signals ... 293
Space between earth and ionosphere, resonance ... 465
Spaced aerials, and their application to direction-finding phase difference observations ... 229
Spherical earth, theory of mixed-path ground-wave propagation ... 401
Spinning goniometer automatic direction finding, design ... 237
Sporadic-*E* and *F*-layer scatter at VHF in the Far East, observation ... 93
Statistics of a radio wave diffracted by a random ionosphere ... 275
Straiton, A. W., C. O. Britt, C. W. Tolbert, Radio wave absorption of several gases in the 100 to 117 kMc/s frequency range ... 15
Sunspot cycle, a quick method for estimating the stage ... 637
Surface and satellite communication systems, mutual interference ... 433
Systems, mutual interference between surface and satellite communication ... 433

T

Target positions, estimation of variances of position lines from fixes with unknown ... 263
Terrain elevation autocovariance ... 427
Terrestrial radio noise at extremely low frequencies ... 581
Thayer, G. D., Formula for radio ray refraction in an exponential atmosphere ... 181
Theisen, J. F., E. E. Gossard, Free-balloon borne meteorological refractometer ... 149
Theoretical scattering coefficient for near vertical incidence from contour maps ... 427
Theory of diffraction by a composite cylinder ... 19
Tolbert, C. W., C. O. Britt, A. W. Straiton, Radio wave absorption of several gases in the 100 to 117 kMc/s frequency range ... 15
Transition processes, nonsingular embedding, within a more general framework of coupled variables ... 595
Transmission, long-distance, characteristics of waveguides ... 75
Transmission loss, monthly median, and refractive index profile characteristics, correlation ... 67
Transmission, VLF mode, east-west effect on across the earth's magnetic field ... 47
Troposphere link, weather and reception level—annual and short-term correlations ... 155
Tropospheric radio propagation, effect of multiple atmospheric inversions ... 385
Tveten, L. H., Ionospheric motions observed with high frequency backscatter sounders ... 115

U

UHF and VHF signal characteristics observed on a long knife-edge diffraction path ... 437
URSI, almost fifty years ... 317
Useful radiation from an underground antenna ... 89
Ulaut, W. E., Effect of antenna radiation angles upon HF radio signals propagated over long distances ... 167

V

Variance classification system for DF bearings, Brooke ... 255
Variances of position lines from fixes with unknown target positions, estimation ... 263
Very low frequencies (VLF) during a sudden ionospheric disturbance (SID), attenuation coefficients for propagation ... 543
VHF and UHF signal characteristics observed on a long knife-edge diffraction path ... 437
VLF and ELF radio waves by a horizontal magnetic dipole, excitation ... 305
VLF atmospheric noise, effect of receiver bandwidth on the amplitude distribution ... 299
VLF navigational aids, effects of the ionosphere ... 575
VLF propagation, a new approach to the mode theory ... 37
VLF propagation, comparison between mode theory and ray theory ... 357
VLF propagation perpendicular to the magnetic meridian, reflection from a sharply bounded ionosphere ... 455
VLF standard frequency and time signal broadcasting worldwide ... 617
Vogler, L. E., Smooth earth diffraction calculations for horizontal polarization ... 397
—, *C. F. Pappas, P. L. Rice*, Graphical determination of radio ray bending in an exponential atmosphere ... 175
Volland, H., Comparison between mode theory and ray theory of VLF propagation ... 357

W

Wait, J. R., A new approach to the mode theory of VLF propagation ... 37
—, A note concerning the excitation of ELF electromagnetic waves ... 481
—, On the theory of mixed-path ground-wave propagation on a spherical earth ... 401
—, *A. G. Jean, A. C. Murphy, D. F. Wasmundt*, Observed attenuation rate of ELF radio waves ... 475
Wasmundt, D. F., A. G. Jean, A. C. Murphy, J. R. Wait, Observed attenuation rate of ELF radio waves ... 475
Watt, A. D., R. W. Plush, W. W. Brown, A. H. Morgan, Worldwide VLF standard frequency and time signal broadcasting ... 617
Waveguides, characteristics for long-distance transmission ... 75
Waves, note concerning the excitation of ELF electromagnetic ... 481
Weather and reception level on a troposphere link—annual and short-term correlations ... 155
Wheeler, H. A., Radio-wave propagation in the earth's crust ... 189
—, Useful radiation from an underground antenna ... 89
Whistler ray paths, computation ... 485
Wilson, A. C., Measurements of low-angle radiation from a monopole ... 641
—, *H. V. Cottony*, A high-resolution rapid-scan antenna ... 101
Wilson, L. D., L. H. Heisler, Design of panoramic ionospheric recorders ... 629
Wind, solar ... 537
Worldwide VLF standard frequency and time signal broadcasting ... 617

Y

Yabroff, I., Computation of whistler ray paths ... 485

U.S. GOVERNMENT PRINTING OFFICE: 1961